

Integration of Tactical Departure Scheduling and Traffic Flow Management, Phase I

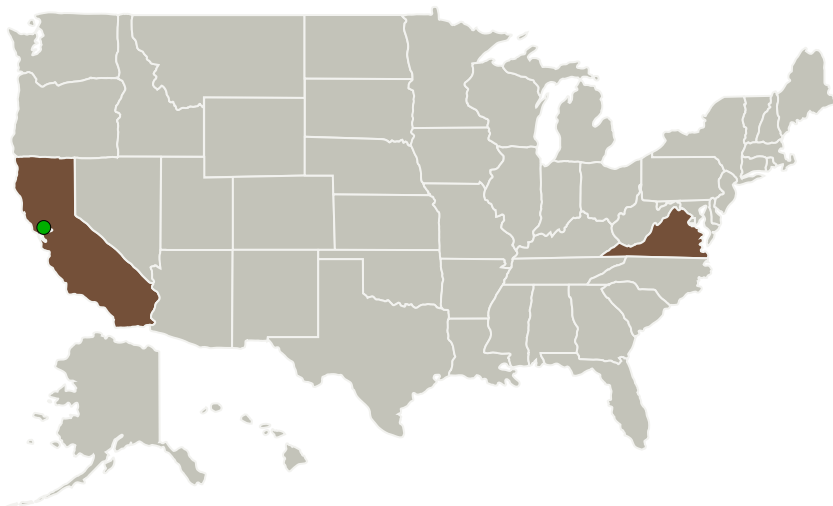
Completed Technology Project (2014 - 2014)



Project Introduction

In the ATM Select topic area of Integrated Arrival, Departure and Surface (IADS) planning, this proposal addresses Tactical Departure Scheduling (TDS), which is a commonly used procedure in the NAS. It is estimated that approximately 60,000 flights each month are subject to tactical delays via TDS, which is approximately 3.5 times the number of flights that are impacted by strategic Traffic Management Initiatives (TMIs). Despite recent advances in tactical departure scheduling like that demonstrated in NASA's Precision Departure Release Capability (PDRC), little is currently known about the overall effect on the NAS when implementing tactical events. In fact, today no comprehensive guidance exists for FAA personnel to determine which TMI to use for a particular traffic problem, the duration of that TMI and the recommended control parameters. An integrated decision support capability is needed to provide ATM specialists and flight operators with information to support planning and decision-making about tactical and strategic TMIs. The significant challenge that exists in providing this decision support capability is the uncertainty of prediction of both demand and capacity. To address this current shortfall of the National Airspace System (NAS), Mosaic ATM proposes to conduct detailed research on the interrelationship between IADS scheduling and metering capabilities and other TMIs. The output of this research will be both mathematical and simulation models that characterize and quantify the relationship between IADS capabilities and other TMIs. These models will provide guidance and input for further NASA research efforts and activities, and they will also provide real-time operational decision support for Traffic Management Coordinators (TMCs) and other ATC specialists.

Primary U.S. Work Locations and Key Partners



$$\text{Delay: } Y(t) = \int_0^t \frac{D(t) - C(t)}{C(t)} dt$$

$$\hat{Y}(t) = Y_0 + \left(\frac{D - \hat{C}}{\hat{C}} \right) t + \frac{\sigma^2}{\hat{C}} W(t)$$

$$PDF_Y(t, y) dy = \frac{1}{\sigma \sqrt{2\pi t}} e^{-\left(y - Y_0 - \left(\frac{D - \hat{C}}{\hat{C}} \right) t \right)^2 / 2\sigma^2 t}$$

Integration of Tactical Departure Scheduling and Traffic Flow Management Project Image

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Organizations Performing Work	Role	Type	Location
Mosaic ATM, Inc.	Lead Organization	Industry	Leesburg, Virginia
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations

California	Virginia
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Project Transitions

June 2014: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140502>)

Images

$$\text{Delay: } Y(t) = \int_0^t \frac{D(t)-C(t)}{C(t)} dt$$

$$\hat{Y}(t) = Y_0 + \left(\frac{D-\hat{C}}{\hat{C}}\right)t + \frac{\sigma^2}{\hat{C}}W(t)$$

$$PDF_{\hat{Y}}(t,y)dy = \frac{1}{\sigma\sqrt{2\pi t}} e^{-\left(y-Y_0-\left(\frac{D-\hat{C}}{\hat{C}}\right)t\right)^2/2\sigma^2 t}$$

Project Image

Integration of Tactical Departure Scheduling and Traffic Flow Management Project Image (<https://techport.nasa.gov/image/130731>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Mosaic ATM, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Chris Brinton

Co-Investigator:

Chris Brinton

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Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX16 Air Traffic Management and Range Tracking Systems
 - └ TX16.3 Traffic Management Concepts

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System